Gear analysis and protocols; Overview of preliminary gear analysis 2007-2017

By David Morin, Glenn Salvador, John Higgins, Mark Minton

GARFO recovered gear procedure and analysis

Primary mission – document, recover and analyze gear retrieved from large whale entanglement cases.

- Forensic quantitative approach; only make conclusions that can be defended with facts.

Ongoing Effort:

Gear analysis and conclusions are compiled by NOAA gear team

- Conduct gear owner interviews, analyze photographs and recovered gear
- Consult with non-US government fishery experts, state agencies and industry experts
- Adapt database and analysis to meet evolving needs
  - Added new data points.
    - During 2018, updating database with documented records such as gear owner interview forms
    - Improving photo record of recovered gear
- Responsive to the ALWTRT prioritization workgroup
    - Accelerating analyses and sharing some preliminary analyses
    - Creating an interactive database
- Gear warehouse available by appointment

2007 - 2017 preliminary gear analysis

	Right	Humpback	Minke	Finback
Overall entanglements	67	211	58	22
Deceased – SI determination	12	15	26	3
Deceased – Non-SI deter.	1	6	7	2
Disentangled – * Non-SI deter.	12	44	11	2
Disentangled – SI determination	0	3	0	0

* Disentanglement teams do not usually attempt to disentangle a whale unless they judge that the entanglement is life threatening.

2007 - 2017 preliminary gear analysis

	Right	Humpback	Minke	Finback
Overall entanglements	67	211	58	22
Monofilament – Non-SI deter.	0	47	1	2
Monofilament – SI (PR) determination	0	3	0	1
Overall entanglements minus monofilament	67	161	57	20

2007 - 2017 preliminary gear analysis

Caveats, definitions and notes for this analysis.

Many variables; we need more input to narrow the analysis

- Endlines are defined as a line associated with a surface system or buoy. However, not all endlines are fishing related. Mooring lines, recreational gear, and tuna vessel anchoring systems have been documented on some animals.
- Gear field tallies may overlap, particularly if different gear parts are involved. Ex. A case with netting and endline/surface system would be counted as 1 in each field.
- We will expand the gear analysis with corresponding rule implementations and older cases this spring/summer.

2007 - 2017 preliminary gear analysis

Additional caveats:

- SI determination includes strandings and disentanglement cases.
  - Older determinations will need to be re-examined.
  - Recent (2016-2017) determinations are preliminary (right whales) or haven't even been completed (other species).
  - Prorated values are counted as 1, and older cases have no prorated values.
- Identified gear parts are from recovered gear or photographs.
  - We did not make an attempt to identify the point of initial interaction. Gear is frequently lost during disentanglement and configurations change over time or during event
- We have very little gear information on Canadian cases.

Preliminary Observations – Weak Links

ALWTRP Prioritization Group requested weak link information:

- Gillnet weak links in the panel, paired with proper anchoring system, appear to work for larger species by allowing the animal to break free from the full net panel. Mid-Atlantic cases showing this have been well documented.

- Challenges: Weak links work if the entanglement configuration or interaction produces sufficient force to break the link, therefore:
  - Some weak link modifications may not provide recoverable evidence if they work (ex. hogrings).
  - Recovered weak links may not indicate that they failed.
  - Weak link absence/presence on recovered gear has not been a stand-alone data point for older analysis. Work will continue in 2018 to update this information.

Preliminary observations – Groundlines

ALWTRP Prioritization Group requested information on sinking groundlines:

- From 2007 through today, few groundlines are recovered from entanglements. Line consistent with endlines is recovered about 10x more often than line consistent with groundline. We are currently comparing evidence from entanglements pre-and post- sinking groundline requirements

Challenge:

- Defining sinking or floating line is not simple:
    - Most endlines are made up of both floating (bottom portion) and sinking (top portion) line.
    - Specific gravity isn't the only data point for determining real-world line profile. Current and tide are also factors.

Preliminary observations – Line Diameter

ALWTRP Prioritization Group requested line diameter observations:

- Recovered line diameters vary from 1/8” to 1+”, consistent with industry practice; line diameter choice is based on fisherman’s vessel size, area fished, bottom type, and experience
- John Kenney analysis from 2005-2011: 3/8” is the most common diameter.
- *Knowlton et al 2016, Conservation Biology – Effects of Fishing Rope Strength on the Severity of Large Whale Entanglements* – also identified 3/8” line as most common from 1994-2010

Broad conclusions:

Basic entanglement theory: If line is in the water column, the possibility of an interaction with a large whale exists.

- There is no new information to refute this theory.
- This does not mean that all in-place management measures are ineffective.
  - Recent and (likely) future changes in whale distribution confounds our ability to target measures.

Line, rope and fishing gear identification is difficult, and precise industry or geographic absolution or attribution is nearly impossible without more marking.

- Since the new marking requirements were implemented, we can identify the source of line about twice as often as previously.

Challenge: Fishermen and mariners are, by their nature, opportunists and innovators and routinely experiment with different setups, equipment and procedures; this prevents the ability from pinpointing gear types/industries involved OR not involved without gear marking.